

Chemistry 311

Chemistry Across the Periodic Table

Fall 2017

Read This Syllabus Today. Keep It for Future Reference.

Chemistry 311, including lab:	4 credit hours
Whole Class Meetings:	1:20 PM: MF B371 Chemistry; W Noland 553 or 579
Discussion Sessions:	7:45 AM: B371 or 1315 Chemistry T or R
Laboratory Sessions:	8:50 – 11:50 AM 1329 Chemistry T or R
Instructor Information:	Professor John Moore 1305 Chemistry (262-5154) http://www.chem.wisc.edu/users/jwmoore jwmoore@chem.wisc.edu
Office Hours:	MF 2:15 – 3:00 PM, R 1:30 – 2:15 PM 1305 Chemistry or call or email for an appointment

The 118 known elements are the building blocks of every substance on earth. In Chem 311 you will learn about patterns of reactivity among chemical families, unique properties of selected elements, and how these reactivity patterns and properties are manifest in biological, environmental, and industrial applications. The course will emphasize coordination chemistry of the transition metals, solid-state chemistry, and specific properties of the representative elements. You will learn about reactivity through laboratory exploration and problem solving. Students in Chem 311 are expected to have successfully completed Chem 104, Chem 109, Chem 115 or an equivalent with a grade of C or above.

Course Organization and Expectations

A recommended study strategy for this course is: 1) read the assigned material in the text before each whole class session, 2) attend class, take your own notes, and actively participate in class exercises, 3) as soon as possible after class, begin to work homework problems. When you encounter problems that you cannot solve, refer to the text, your notes, library resources, or your fellow students. Forming a study group with fellow students to review and problem solve is an excellent way to learn chemistry.

To help you to master the new material presented in this course, specific learning objectives are provided as part of each problem set and for each exam. The exam objectives are available within the Exam assignments in Canvas (see below). Use the learning objectives to guide your work on the problem sets and practice exams for that course unit. Practice exams keyed to the learning objectives are also available in the Exam assignments. Fully worked out answer keys will be made available for you to use to check your work on the practice exams two days before the exam.

Various learning activities are offered to meet the needs of different types of students; however, if you find that your learning needs are not being met or that you are not satisfied with some aspect of the course please bring your concern to Prof. Moore or your TA.

Evaluation Strategies: Three midterm exams, a final exam, ten problem sets, nine collaborative learning sessions, and 14 laboratory assignments (see p 3) will be the basis for your grade in Chem 311. The midterm exams will be held during class on Fri., Sept. 29, Fri., Oct. 27, and Fri., Nov. 17. The final exam will be held at 7:25 to 9:25 PM on Monday, Dec. 18. Please notify Prof. Moore and your TA of any conflicts promptly.

Required Text & Materials

Textbook: *Descriptive Inorganic, Coordination, and Solid-State Chemistry*, 3rd Edition, Glen E. Rodgers, Brooks/Cole Cengage, 2012, available from local bookstores or on-line.

Calculator: An inexpensive calculator is required. It should have capabilities for square roots, logarithms and exponentiation (antilogarithms), and exponential (scientific) notation operations. You may use programmable calculators in this course.

Required for Lab: These materials may be purchased from Alpha Chi Sigma (AXΣ) in room 1375 of the chemistry building from Tuesday, Sept. 5 to Friday, Sept. 15 between the hours of 7:45 AM and 4:45 PM. Purchases through AXΣ can only be made with Wiscard or cash, as indicated below.

Lab Manual *Chemistry 311, Laboratory Manual*, Fall 2017 edition. (Wiscard only, \$20.00)

Lab Notebook: Carbonless laboratory notebook with duplicate pages. You will need a new notebook for Chem 311 because you will use all the pages. (Cash only, \$15)

Lab Coat: A lab coat is required at all times when you are in the lab. (Wiscard only, \$12)

Safety Goggles: Industrial quality eye protection is required at all times when you are in the lab (must completely seal around the eyes and fit over regular glasses if you wear glasses). (Cash only, \$5.00)

Local bookstores sell appropriate lab notebooks and safety goggles, for a higher price.

Optional Materials: It is useful to be able to refer to a general chemistry textbook such as *Chemistry: The Molecular Science* by Moore and Stanitski. An online general chemistry textbook (OLT) is available in Canvas and some assignments refer to this online book. It is useful to have a molecular model kit that has several atoms with six bond sites at 90° angles.

Chem 311 Canvas Web Site

Much material for this course is only available via Canvas. You automatically have access to the 311 materials via Canvas (<https://canvas.wisc.edu/>) if you are enrolled in this course. If you have a problem logging in, and you have been registered for Chem 311 for at least two days, send an email to instructional technology specialist Dr. Rachel Bain, rbain@chem.wisc.edu.

Problem Sets: Problem sets are always due on Wednesday at the beginning of class (which will be in Noland Hall room 553 (Sec. 601 and 602) or 579 (Sec. 603 and 604) on most Wednesdays). Each problem set will take several hours to complete and some require software that you may need to install on your computer or use in the Chemistry Computer Room so start working on the problem set as early as possible. Problem sets will be graded on a low-resolution scale: 0 (not turned in), 3, 4, or 5 points. Working on the problem set for each week provides preparation for the Collaborative Learning Session held each Wednesday.

Collaborative Learning Sessions: Most Wednesdays during the semester the class will meet in a Collaborative Learning Classroom, Noland 553 (Sec. 601 and 602) or 579 (Sec. 603 and 604). Each Collaborative Learning Session will be based on understanding of the problem set due at the start of class. You will work with a partner or with a larger group discussing concepts and questions on a Discussion Activities Worksheet. At the end of class, you will turn in the worksheet with answers to the questions. Discussion Activities Worksheets will be graded on a low-resolution scale: 0 (not turned in), 3, 4, or 5 points.

Laboratory: The Chem 311 laboratory is designed to be an integral part of your learning experience. In the lab, you will focus on two primary objectives: the synthesis of compounds and the analysis of their structure. These are essential goals of modern inorganic chemistry research. Your lab exercises

will give you the opportunity to explore the reactivity of a wide variety of elements with your own hands, and you will experience the beauty and variety of inorganic compounds. Many people who become inorganic chemists were inspired by their lab experience.

Laboratory Reports/Assignments and their point values are listed here.

LabWrite assignment		5
Malachite Bead		10
Polysiloxanes	CPR	10
Prussian Blue		10
UV-Vis Tutorial		10
IR Tutorial		10
Rhodium Rainbow		10
Lewis Acid-Base Adduct	CPR	20
DMSO Complexes		20
Magnetic Susceptibility	CPR	20
Nickel Series		40
Cobalt Salen	CPR	40
Nickel Nanotechnology		20
OLED		10
Total		235

Calibrated Peer Review (CPR)

Four of your lab reports will be evaluated using Calibrated Peer Review (CPR) a system designed to help you learn how to write a scientific report. Using CPR you will also learn how to recognize a well written scientific report, how to evaluate your own writing, and how to review and evaluate other students' work.

CPR requires that you demonstrate your ability to recognize good scientific writing by a process called calibration. During calibration, you will be asked to read three versions of the same laboratory report and to recognize the good and bad aspects of each report. CPR will then ask you questions about each report so that you can demonstrate that you can distinguish a poor report from an average and a good report. The calibration process is to ensure that when you evaluate the reports of other students you can do so in a consistent and fair way. It is also designed to teach you how to recognize when a report you have written is good enough to submit for evaluation by others.

CPR involves a process called *peer review* that is used to evaluate scientific papers to decide whether they should be published. When a scientist completes a research study, writes a report, and submits the report to a scientific journal for publication, the editor of the journal must decide whether to publish the report, to ask the author to revise it, or to decline to publish because the report is not good enough. Other scientists who do research similar to that reported in the paper—peer reviewers—are asked to review the paper and provide to the editor their opinions regarding its quality. Peer reviewers provide constructive, courteous criticism of the paper, which the editor returns to the author so that the author can improve the paper. In Chem 311 you will serve as a peer reviewer of your own laboratory report and of the reports of three other students.

For each experiment with a CPR report you will write an individual laboratory report and prepare it for

upload to CPR. Then you will review three laboratory reports that your instructors have written. The three reports illustrate high quality, medium quality, and low quality. You will use these reports to calibrate your ability to recognize a well written report; part of your grade will depend on how well you calibrate. Next, you will read and review three laboratory reports by other students in Chemistry 311. As is often true in peer review of scientific papers, the reports will be anonymous—you won't know who wrote each report you review. As is almost always true in peer review of scientific papers, the reviewers will also be anonymous—after the reviews are completed, you won't know who the three reviewers of your report were. At the end of the process you will be able to see the reviews of your work and use them to improve your subsequent lab reports. Chem 311 TAs have observed that after using CPR the quality of students' lab reports increases significantly, which is good because whatever your future career the ability to report scientific results is going to be an important skill that potential employers will value.

Lab Report Criteria

Any scientific report should provide information in a format that is easily assimilated and interpreted by a reader. As you write each lab report consider these questions and make certain that you have addressed each of them in your report. Your TA will use these criteria to evaluate your report but note that some will be weighted more strongly than others; it is not sufficient just to check off each box but rather the overall presentation is what counts.

1. Does the title describe the report content concisely, adequately and appropriately?
2. Does the abstract convey a sense of the full report concisely and effectively? Is there a clear statement of the overall findings?
3. Does the introduction provide sufficient information for the reader to understand the concepts tested, the purpose, and the scientific context of this laboratory exercise?
4. Is the procedure clearly and completely described with an appropriate level of detail that would allow someone to reproduce the experiment?
5. Are the results described clearly and with sufficient support? Are the findings, observations, and characterization data presented logically and appropriately?
6. Are figures and tables used effectively in this report, providing clear and accurate information?
7. Does this report successfully integrate figures and tables with the text? Do the figures and tables help to create a concise and effective presentation?
8. Does the discussion include a summary of the findings and back up this summary with specific reference to the results? Is there sufficient explanation of the results and is it presented logically? Are the results effectively placed in a broader scientific context?
9. Are the conclusions clearly stated and well supported?
10. Are there two or more references to appropriate sources of information and are they cited using ACS format?

You will also be evaluated on the attention to safety and effectiveness of your laboratory work and on the quality of your laboratory notebook, which should contain a legible and complete record of the experiment.

Chem Tutor Review Assignments

Much of the content of Chem. 311 depends on things you learned in general chemistry, either Chem 103-104, or Chem. 109. In particular, you need to review electron configurations and covalent bonding. To help you review that material we have provided seven assignments in Chem Tutor, a new online tutoring system for general chemistry that is being developed at UW-Madison by Professor Martina Rau in the

Department of Educational Psychology.

Most Chem Tutor assignments consist of three parts: a pre-test, a tutorial unit, and a post-test. To get credit for an assignment you must do all parts before the deadline—you will get zero credit unless all parts have been completed in the order they are listed below.

Here is a list of the Chem Tutor assignments and their due dates. Each complete assignment is worth three points.

Assignment 1	Mental Rotations Test Electron Configuration – Unit 0 – Introduction	Monday, Sept. 11, 11:55 PM
Assignment 2	Electron Configuration – Pre-Test Unit 1 Electron Configuration – Unit 1 Electron Configuration – Post-Test Unit 1	Monday, Sept. 11, 11:55 PM
Assignment 3	Electron Configuration – Pre-Test Unit 4 Electron Configuration – Unit 4 Electron Configuration – Post-Test Unit 4	Monday, Sept. 18, 11:55 PM
Assignment 4	Covalent Bonding – Pre-Test Unit 9 Covalent Bonding – Unit 9 Covalent Bonding – Post-Test Unit 9	Monday, Sept. 18, 11:55 PM
Assignment 5	Covalent Bonding – Pre-Test Unit 5 Covalent Bonding – Unit 5 Covalent Bonding – Post-Test Unit 5	Monday, Sept. 25, 11:55 PM
Assignment 6	Covalent Bonding – Pre-Test Unit 7 Covalent Bonding – Unit 7 Covalent Bonding – Post-Test Unit 7	Monday, Oct. 2, 11:55 PM
Assignment 7	Electron Configuration – Pre-Test Unit 6 Electron Configuration – Unit 6 Electron Configuration – Post-Test Unit 6	Monday, Nov. 6, 11:55 PM

How to Access Chem Tutor.

- Go to <https://chem.tutorshop.web.cmu.edu/>
- Username: same as your WISC ID (e.g., bbadger). (*Do not* include @wisc.edu)
- Password: chemistry

What you need to know before you start

- The system works best in Chrome
- It will *not* work on your smart phone or tablet
- There is an automatic check of
 - whether you spent less time on each problem than it would take to read the problem
 - whether you randomly guessed each answer

If you run into issues with the software, contact marau@wisc.edu.

Exams

Learning Objectives, Study Questions and Practice Exams: Learning objectives and a practice exam for each unit are posted in Canvas. The course topic schedule lists a selected set of additional study questions from the textbook, which are keyed to the learning objectives for that unit. The study questions are typical of those you should master and you should use them to build your mastery of the course content.

How To Prepare For Exams: A recommended strategy is: 1) review the learning objectives for the exam referring to your notes or the text if necessary, 2) work the study questions associated with each objective, spending more time working problems on those topics you find most challenging, 3) simulate the test taking situation by working the practice exam in 50 minutes in a quiet place, 4) “grade” your own test using the answer key as your guide, 5) review those areas that you identify as weak, working extra problems in these areas to reinforce your knowledge.

Important Administrative Information for Chemistry 311

Electronic Mail: You are encouraged to contact Prof. Moore by email if you have questions about anything to do with the management or content of this course. Electronic mail is available at all times of day and night, so you can send messages whenever something comes to mind. Do not, however, expect immediate responses in the middle of the night! Prof. M.’s email address is jwmoore@chem.wisc.edu.

Because Prof. Moore gets hundreds of messages every day to that account, he asks that you put the words “Chem 311” in the subject line of any message you send to him. NOTE: *Messages sent without this subject line may go unread!*

What to Do if You Are Sick or Otherwise Unable to Attend a Class, Exam, or Lab: If you are unable to attend a specific class session because of an unavoidable schedule conflict, for example a religious observance, an athletic activity or a family obligation, contact your TA as soon as possible to reschedule. Make up labs can be arranged only during the week when the entire class is doing a lab exercise, so planning ahead is important. If you find that you are unable to attend lab because you are ill, contact your TA as soon as possible. He or she will discuss your situation and decide what to do. **If circumstances arise unexpectedly that preclude your taking an exam, please contact your TA and Prof. Moore before the scheduled exam time.** We recognize that in an emergency situation, you may not be able to contact us in a timely way but do the best you can.

Chemistry Resource Facilities - Computer Room, Study Room, Undergraduate Chemistry Office: Computers are available for use in room 1375 Chemistry. Room 1371 is a study room for chemistry students. The staff in the Undergraduate Chemistry Office, room 1328, can assist you with enrollment, advising, and many other things.

Cell Phone Policy: If you bring a cell phone to class or lab, please silence it for the duration of the class or lab period. If there is a situation that absolutely requires you to answer your cell phone during a class, please set the phone to silent/vibrate and sit in a location where you do not disturb other students when leaving the classroom to accept a call.

Course Schedule: A Course Schedule is posted in Canvas to help you plan your study schedule for Chem 311. This schedule lists the due dates for all problem sets, the names of the weekly lab exercises, which experiments have peer-reviewed (CPR) lab reports, and the exam dates. Instructions for each problem set, lab exercise and exam may be found within the specific assignment in Canvas.

Grades:

Your grade will be based on a maximum of 681 points divided as follows:

Ten Problem Sets @ 5 points each (see course calendar for due dates)	50 points
Nine Discussion Activities Worksheets @ 5 points each (see course calendar for due dates)	45 points
Seven Chem Tutor assignments @ 3 points each	21 points
Laboratory reports/assignments (including 5-point LabWrite worksheet and 20-point TA personal evaluation of your overall lab work) (each week's experiment is listed in the schedule)	255 points
Three midterm exams @ 60 points each (dates and times are listed in the course calendar)	180 points
Final Exam (date and time is listed in the course schedule)	120 points
Course Total	671 points

Letter Grades: Final letter grades will be based upon the absolute scale shown below. If you score the number of points indicated, then you will receive the letter grade indicated, regardless of how many other students achieve the same grade. There is no curve. Therefore, it is to your benefit (and to your friends' benefit) that you help other students learn and they help you learn.

A	604 points or more	≥90%
AB	577 to 604 points	86-90%
B	544 to 577 points	81-86%
BC	517 to 544 points	77-81%
C	456 to 517 points	68-77%
D	402 to 456 points	60-68%
F	<402 points	<60%

If necessary, adjustments will be made at the end of the semester, but these adjustments will never lower your final letter grade, only raise it.



Lecture, Laboratory, and Examination Schedule

Date	Subject	Reading/Web	Questions and Problems	Laboratory
<i>September</i>		Study before class	Work out before class	
W 6	Introduction; Atomic Electronic Structure.	OLT, Ch 5 (all); CMS, Review Ch. 7.	OLT, Ch 5, Q 8, 9, 10, 11, 12. (Q means end-of-chapter question)	Chem Tutor assignments are due at 11:55 PM on the dates indicated.
F 8	Schroedinger Equation; Wave Functions and Orbitals; Shielding;	ORBITAL OLT, Formal Charge	OLT, Ch. 5, Q 17, 22, 23, 27, 28, 29.	LabWrite assignment due Monday at 1:20 PM in class
M 11	Effective Nuclear Charge; Chemical Periodicity; Periodic Properties.	R, Ch 1, Ch 9, Sec 1-2 CMS, Rev. Ch. 8, 9.	R, Ch 9, Q 1, 4, 8, 11, 12, 15, 20, 23, 24, 26, 28. Chem Tutor Asgt 1 and Asgt 2 due	Malachite Bead, p 55 Hand in Academic Integrity statement
W 13 Noland 553 579	Special Aspects of Periodicity	R, Ch 9, Sec 3-5	R, Ch 9, Q 32 34 39 40 46 47 53 54. Turn in Problem Set 1 at start of class.	On dates shown in red the class will meet in Noland rooms 553 (Sec. 601 and 602) and 579 (Sec. 603 and 604).
F 15	Molecular Orbital Theory	OLT, Ch 21 (all)		
M 18	Molecular Orbital Theory	CMS, Ch 8, Sec 12 MO Theory	OLT, Ch 21, Q 8, 9, 32, 33, 34, 36, 37, 39, 41, 43 Chem Tutor Asgt 3 and Asgt 4 due	Polysiloxanes, p 57 Report via CPR (see directions for using CPR in Canvas)
W 20 Noland	Molecular Orbital Theory		Turn in Problem Set 2 at start of class.	
F 22	Coordination Compounds; Werner Coordination Theory	R, Ch 2, Sec 1, 2	R, Ch 2, Q 8, 9, 11, 12, 13, 17	
M 25	Coordination Compounds: Nomenclature	R, Ch 2, Sec 3, 4	R, Ch 2, Q 19, 21, 23, 25, 26, 29, 30, 34, 35, 38. Chem Tutor Asgt 5 due	Synthesis of Prussian Blue, p 63; Infrared Spectroscopy Tutorial, p 67; Rhodium Rainbow, p 69; UV-Vis Spectroscopy Tutorial, p 75.
W 27 Noland	Coordination Compounds: Structure and Isomerism	R, Ch 3, Sec 1-2.	R, Ch 3, Q 4, 8, 12, 14, 15, 17, 18, 24. Turn in Problem Set 3 at start of class	
F 29	Midterm Exam I (in class)			

Date	Subject	Reading/Web	Questions and Problems	Laboratory This Week
<i>October</i>				
M 2	Coordination Compounds: Structure and Isomerism	R, Ch 3, Sec 3-6.	R, Ch 3, Q 25, 29, 30, 32, 35, 37, 45, 48, 49, 52, 57. Chem Tutor Asgt 6 due	Lewis Acid-Base Adduct, p 79 Report via CPR
W 4	Crystal Field Theory	R, Ch 4, Sec 1, 2.	R, Ch 4, Q 1, 2, 3, 4, 5, 10, 11, 15, 16, 18, 21, 22, 27, 30.	
F 6	Crystal Field Theory: Applications	R, Ch 4, Sec 3.	R, Ch 4, Q 31, 32, 34, 35, 36, 38, 39, 41, 46, 47, 48, 49, 55, 56, 62, 66.	
M 9	Coordination Compounds: Reactions	R, Ch 5, Sec 1-3.	R, Ch 5, Q 1, 2, 3, 8, 10, 11, 12, 15, 17, 18, 24, 26.	Fe and Ru Complexes of DMSO; p 87;
W 11 Noland	Coordination Compounds: Rates and Mechanisms of Reactions	R, Ch 5, Sec 3-5.	R, Ch 5, Q 28, 29, 31, 32, 37, 39, 41, 44, 47, 53, 54, 57, 58, 62. Turn in Problem Set 4 at start of class.	
F 13	Coordination Compounds: Applications	R, Ch 6, Sec 1-4.	R, Ch 6, Q 1, 3, 4, 7, 10, 11, 12, 14, 15, 16, 19, 24, 26.	
M 16	Coordination Compounds: Bioinorganic Applications	R, Ch 6, Sec 5.	R, Ch 6, Q 30, 31, 32, 34, 35, 38.	Magnetic Susceptibility, p 91 Report via CPR
W 18 Noland	The Solid State: Types of Crystals; Metallic Bonding	R, Ch 7, Sec 1. OLT, Ch 22, Sec 1.	OLT, Ch 22, Q 4 6 7 11 12. Turn in Problem Set 5 at start of class.	
F 20	The Solid State; Unit Cells	R, Ch 7, Sec 2	R, Ch 7, Q 2, 3, 4, 8, 9, 10.	
M 23	Ionic Solids: AB and AB ₂ Structures; Radius Ratio	R, Ch 7, Sec 3-4 Web, Window on the Solid State, 1-4.	R, Ch 7, Q 11, 12, 15, 16, 18, 20, 23, 24, 27, 28, 29, 30, 33, 36, 39, 42, 44, 45, 50, 52.	Nickel Series, p 95
W 25 Noland	Ionic Solids: Defects; Spinel	R, Ch 7, Sec 5-6;	R, Ch 7 Q 55, 56, 57, 59, 60. Turn in Problem Set 6 at start of class.	
F 27	Midterm Exam II (in class)			

Date	Subject	Reading/Web	Questions and Problems	Laboratory This Week
<i>October</i>				
M 30	Crystal Lattice Energy	R, Ch 8, Sec 1; Lattice Energetics prog.	R, Ch 8, Q 2, 8, 13, 17, 22, 26.	Nickel Series (ctd); Begin Cobalt(salen)-Oxygen Adduct Complexes; p 99
<i>November</i>				
W 1	Crystal Lattice Energy: Born-Haber Cycle; Crystal Field Effects	R, Ch 8, Sec 2-3.	R, Ch 8, Q 28, 37, 40, 42, 44.	
F 3	Hydrogen and Hydrides	R, Ch 10, Sec 1-4 Read the chapter on nuclear chemistry in a gen chem book;	R, Ch 10, Q 1, 3, 5, 12, 14, 24, 26, 34, 42.	
M 6	Hydrogen and Hydrides	R, Ch 10, Sec 5-6.	R, Ch 10, Q 49, 51, 53, 60. Chem Tutor Asgt 7 due	Cobalt(salen) Complexes (ctd)
W 8 Noland	Oxygen and Oxides	R, Ch 11, Sec 1-3.	R, Ch 11, Q 3, 10, 14, 20, 24, 30, 34, 36, 38, 40, 42. Turn in Problem Set 7 at start of class.	
F 10	Acids; Ozone; Greenhouse Effect	R, Ch 11, Sec 4-6.	R, Ch 11, Q 43, 45, 47, 48, 49, 52, 54, 56, 67, 68, 72.	
M 13	Alkali Metals	R, Ch 12, Sec 1-6.	R, Ch 12, Q 16, 18, 23, 25, 27, 29, 33, 35, 39, 40, 41, 47, 49, 55, 57.	Cobalt(salen) Complexes (ctd.) Report via CPR; due after Exam III.
W 15 Noland	Alkaline Earth Metals	R, Ch 13, Sec 1-4.	R, Ch 13, Q 1, 6, 10, 14, 20, 21, 24, 28, 38, 40, 44. Turn in Problem Set 8 at start of class.	
F 17	Midterm Exam III (in class)			

Date	Subject	Reading/Web	Questions and Problems	Laboratory This Week
<i>November</i>				
M 20	Group 3A Elements	R, Ch 14, Sec 1, 2, 4.	R, Ch 14, Q1, 4, 9, 11, 15, 24, 30, 36, 38, 44, 65.	
W 22	Group 4A Elements: Tin, Lead	R, Ch 15, Sec 1, p 433-438 (for Sn and Pb)	R, Ch 15, Q 1, 7, 8, 11, 19, 20, 22, 48, 51, 52.	
<i>Break</i>				
M 27	Group 4A Elements: Carbon	R, Ch. 15, Sec 1-4	R, Ch 15, Q 35, 38, 45.	Nickel Nanotech, p 105; Begin OLED, p 113 (Synthesis of [Ru(bpy)₃](BF₄)₂)
W 29 Chem B371	Group 4A Elements: Silicon, Germanium--Semiconductors	R, Ch 15, Sec 5	R, Ch 15, Q 13, 15, 61, 63, 64, 68, 70.	Note that today we will meet in Chemistry room B371.
<i>December</i>				
F 1	Group 5A Elements: Nitrogen	R, Ch 16, Sec 1-3	R, Ch 16, Q 8, 15, 29, 35, 38, 42, 44, 46, 47, 49, 53, 55, 66.	
M 4	Group 5A Elements: Phosphorus	R, Ch 16, Sec 4-5	R, Ch 16, Q 17, 19, 23, 59, 73, 77.	OLED (ctd); Check out.
W 6 Noland	Group 6A Elements: Sulfur, Selenium, Tellurium, Polonium	R, Ch 17, Sec 1-3.	R, Ch 17, Q 5, 7, 9, 11, 21, 23, 30, 32, 38, 45, 46, 49, 58, 60. Turn in Problem Set 9 at start of class.	
F 8	Group 6A Elements: Acid Rain Group 7A Elements: Halogens	R, Ch 17, Sec 4-5 R, Ch 18, Sec 1-3.	R, Ch 17, Q 63, 64, 65, 68.	
M 11	Group 7A Elements: Interhalogens; Chlorofluorocarbons	R, Ch 18, Sec 4-6.	R, Ch 18, Q 4, 10, 12, 15, 19, 21, 27, 33, 37, 41, 52, 57, 68, 79.	
W 13	Review for Final Exam			

FINAL EXAM Monday, December 18, 7:25 to 9:25 PM; room to be announced.